

Scoping Comments: Gateway Pacific Terminal

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CHERRY POINT PACIFIC HERRING STOCK

Foreseeable Significant Adverse Impacts Resulting From Construction and Operation of the Gateway Pacific Terminal

I. Introduction:

Historically, the Pacific herring (*Clupea pallasii*) stock originating in the Cherry Point region of the Salish Sea has been documented to produce nearly half of the total herring biomass in the Puget Sound area (Stick 2005). Recently, and corresponding with the industrial development of the Cherry Point area, there has been a dramatic collapse of this population. In part, the State of Washington established the Cherry Point Aquatic Reserve to protect and improve the Cherry Point Pacific herring stock. The causes of this population collapse are poorly understood and studies to date have suggested a number of possible causes, but have not been definitive. Any Environmental Impact Statement must include studies that will lead to a solid understanding of the stressors effecting the population fluctuations of the Cherry Point herring stock.

Siting a new facility in the middle of the herring spawning beds will likely have significant adverse impacts, some of which may cause irreparable damage to the herring population and the greater Puget Sound ecosystem. It should be the position of the EIS document preparers to always aim at protecting the Cherry Point aquatic ecosystem and specifically ensuring that any actions will result in “no net loss” in the population of the Cherry Point herring stock, in accordance with the Washington Administrative Code Hydraulic Code Rules, WDFW 2007.

It is the intent of this scoping comment to identify foreseeable adverse impacts on the Cherry Point Pacific herring stock that are likely to occur as a result of the construction and operation of the Gateway Pacific Terminal. A number of these foreseeable adverse impacts will directly effect the Cherry Point Pacific herring stock. These significant adverse impacts may be local or regional, degrading the local Cherry Point ecosystem as well as the wider Salish Sea ecosystem. These adverse impacts may be direct, indirect, and/or cumulative. In order for the EIS to properly address these impacts a more thorough understanding of the dynamics of the Cherry Point ecosystem is necessary. To accomplish that task new or updated information needs to be gathered by impartial observers.

II. Foreseeable Significant Adverse Impacts to be considered during scoping.

A. Adverse Impacts Related to Site Construction and Structures:

1. Shading: Overhead structures reduce the light available for the growth of eel grass and various algae on which Pacific herring lay their eggs. This reduction in the available light can significantly reduce the number of available plants or even eliminate them entirely, thus reducing the available spawning habitat.

“There are few species of marine macro-vegetation that can tolerate the reduction in ambient light within the direct footprint of a typical overwater dock or pier, including plant species used by spawning herring (WDFW unpub. data). Introduction of fixed overwater structures invariably results in a die-off of vegetation directly beneath and may also show negative impacts on either side.” (Marine Forage Fishes in Puget Sound, 2007-03)

Overhead shading can also negatively effect the ability of prey organisms, such as herring, to avoid predators because of an inability of their eyes to rapidly adjust to changing conditions. (Nightingale and Simenstad, 1999 and 2001)

2. Dredging: During scoping dredging and related activities associated with facility construction should be considered.

“Dredging is a primary activity that can destroy nearshore marine vegetation, to the detriment of herring spawning habitat... Dredging is prohibited in herring spawning beds by WDFW under WAC 220-110-320(8).” (Marine Forage Fishes in Puget Sound, 2007-03)

3. Armoring: Armoring reduces the spacial area of spawning beds for all beach spawning forage fish and changes the flow and replacement of substrate material. Over time spawn habitat will be materially and permanently changed thus significantly and adversely effecting the goal of “no net loss” of spawning beds in the Cherry Point area.

“Williams and Thom (2001) reviewed the potential impacts of various forms of shoreline armoring on nearshore environmental factors and resources in the Puget Sound region. Shoreline armoring may be the primary threat to surf smelt and sand lance spawning habitat (Thom et al. 1994). Armoring affects spawning habitat by physical burial of the upper intertidal zone during the course of creating or protecting human infrastructure and activities. Prior to detailed studies of forage fish spawning habitat, it was presumed that the upper third of the intertidal zone could be sacrificed to development without concern. This high beach zone did not appear to support any biological resources.”

“Armoring also blocks, delays or eliminates the natural erosion of material onto the beach and its subsequent trans- port (Johannessen and MacLennan 2007). These processes maintain forage fish spawning substrate on the upper beach (Williams and Thom 2001). Although beaches may appear to be stable, their sediment is in constant motion, driven by prevailing wind and waves. The sand and gravel making up forage fish spawning substrate moves along the shoreline and eventually off into deep water, and must be replaced by new material entering the shoreline sediment transport system. A lack of a constant supply of new sand and gravel, primarily derived

from eroding shoreline bluffs, may lead to coarsening, lowering of the beach elevation, and thus long-term degradation of spawning habitat.

The WDFW Hydraulic Code Rules stipulate that the construction of bulkheads and other bank protection must not result in a permanent loss of forage fish spawning beds (WAC 220-110-280(4)). Permissible in-water development activities are also subject to seasonal work-closure periods during local forage fish spawning seasons (WAC 220-110-271(1)). WDFW hydraulic permits granted for in-water development actions may stipulate certain measures to mitigate unavoidable forage fish habitat losses and address interruptions to beach sediment sources and movements.” (Marine Forage Fishes in Puget Sound, 2007-03)

4. Sediment drift: The near-shore environment is composed of both biotic and abiotic components. Primarily, the abiotic parts, e.g., sand, gravel, silt, rocks, etc., form the substrate upon which, or within which, the biotic segment lives. Wave action and the flow of long shore currents would, over time, strip the near-shore of all the fine material so important to supporting a healthy marine plant community. Sediment drift, a continuing inflow of fine material, either from mass wasting of the shoreline or movement of materials via currents along the near-shore and beach is necessary to continued beach and nearshore replenishment. Any structure or armoring that blocks the natural movement and replacement of material will be detrimental to a continuing health ecosystem.

B. Adverse Impacts Related to facility operation.

1. Propeller wash: The churning of the water column by the actions of a ship’s propellers disrupts the normal activities of fish and other animal life. In addition, if the action is caused by the powerful screws of a tugboat pushing a large, fully loaded Capesize ship away from a dock it could be very disruptive to spawning, egg retention, or even plant life.

“EVS (1999) provided a summary of marine vessel traffic likely to be encountered at Cherry Point. The largest tankers allowed to operate in Puget Sound displace 125,000 dead-weight tons (dwt). They may be as long as 290 m. Cargo ships that visit the Alcoa Intalco pier displace approximately 40,000 dwt with a draft of 9 m. Tug boats that assist marine shipping also range in size and may be propelled by conventional screw propellers (“conventional tug”) or by V-S propellers, which consist of assemblies of vanes mounted vertically beneath the tug hull (“tractor tug”). The most powerful class of tractor tugs is about 47 m long and operates at 8,000 horsepower. The bottom hull of these tugs is approximately 4 m below the water surface, and the propulsion assembly extends over 2 m below the hull. Conventionally propelled tugs have twin screws mounted nearer the water surface than to the bottom of the hull and range from 4,000 to 7,200 horsepower. Other marine traffic in the Cherry Point area includes pleasure craft, fishing vessels, and other types of commercial shipping vessels.”

2. Noise: Noise from marine traffic is pervasive in Washington's inland waters. It is well known that marine mammals are adversely affected by too much noise. It has also been noted by many sources that Pacific herring also react negatively to acoustic stimulus.

"It remains uncertain whether noise from vessels in the vicinity of Pacific herring spawning grounds would cause adverse effects (Schwarz and Greer 1984), although reaction to simulated marine mammal echolocation sounds (Wilson and Dill 2002) and apparent production of endogenous sounds (Wilson et al. 2003) suggest that Pacific herring respond to many auditory inputs. Fish in general show an avoidance response to vessels within 100–200 m, when the noise threshold is exceeded by 30 decibels (dB) (Mitson 1995). Larger ships may affect Pacific herring from a greater distance compared to smaller vessels (Schwarz and Greer 1984). Assuming that Pacific herring have a noise threshold of 75 dB and vessels generally emit noise levels of 145 dB in the same frequency range, Pacific herring would be able to detect the vessels (EVS 1999). However, it is uncertain whether they would be sufficiently disturbed to react to vessel sounds, given the uncertain effects of various parameters and their interactions, for example, whether fish are feeding or migrating, water temperature, light levels, and physiological condition. The Cherry Point stock has continuously spawned near the BP Cherry Point refinery pier, despite the elevated vessel traffic and associated noise (EVS 1999). Nonetheless, under some conditions, vessel noise could pose a potential risk factor to Cherry Point Pacific herring. (NOAA Technical Memorandum NMFS-NWFSC-76)

3. Coal dust: Coal dust has been shown to disperse into the local environment at coal terminals where it can concentrate to a level that is detrimental to the local flora and fauna.

"A 1999 assessment of sediments, adjacent to the Roberts Bank coal terminal in Delta, British Columbia, Canada, shows that the concentration of coal particles (reported as non-hydrolysable solids or NHS) has increased substantially since a prior study in 1977. (Johnson, Ryan and Bustin, R. M., 2008)

Coal distribution would likely affect those benthic flora and fauna, most susceptible to coal dust coverage and possible anoxic conditions that might arise during coal oxidation within very close proximity (0–100 m) to the coal-loading terminal." (Johnson, Ryan and Bustin, R. M., 2008)

4. Artificial Lights: Pier lights have been shown to have adverse effects on forage fish, such as Pacific herring. Many fish have been shown to use the whole spectrum of light when hunting for prey. Artificial lights only provide a portion of that spectrum, with fluorescent lights missing important UV sections entirely. Intense artificial lighting on piers may cause fish to expend large amounts of energy hunting with little to show for it. (Nightingale and Simenstad 2001)

5. Increased marine traffic: Increased maritime vessel traffic will likely cause adverse impacts through the disruption of pre-spawner holding area. Prior to spawning herring hold in an off-shore area to the west of the spawning area. It appears that fish enter the area, stay for awhile, and then leave to begin spawning in the near shore. Fish are rotating into and out of the holding

area throughout the spawning season, indicating that for almost 3 months out of any given year some segment of the Cherry Point Pacific herring stock is being subjected to marine vessel traffic while it prepares itself physiologically for spawning.

Increased maritime vessel traffic at the GPT facility will disrupt nearshore spawning activities.

Note that the largest Capesize vessels would be approximately 50% larger than the referenced tankers identified below and would therefore have a greater effect on herring when crossing the holding areas as well as when docking near the spawning beds.

“Washington Department of Ecology estimates that approximately 95% of all tanker traffic into the Cherry Point area approaches through the Strait of Juan de Fuca and then northward through Rosario Strait. The passage through Georgia Strait, which represents the northern access to Cherry Point, is narrow and more restrictive to tanker traffic (EVS 1999).”

At Cherry Point, spawning Pacific herring hold in an area offshore prior to moving inshore to the spawning habitat. The holding area serves as a dynamic migration corridor; in the sense that some Pacific herring leave the holding area as others enter it. According to EVS (1999), the shipping lanes for tanker traffic passage to the BP Cherry Point refinery pier likely cross the eastern portion of this holding area, although because the approach to the BP Cherry Point refinery pier is always into the current, and because tidal currents reverse over a tidal cycle, different approaches are used.

Assuming that the largest inbound tankers to the BP Cherry Point refinery pier draw no more than 14.6 m (i.e., the lowest point of the tanker’s hull is 14.6 m below the water line), they are not likely to have a direct effect on Pacific herring. According to EVS (1999), recent monitoring of Pacific herring offshore of the spawning habitat shows that the Pacific herring hold near the bottom in depths from 21 to 37 m below the surface, which is over 8 m beneath the largest vessel’s hull. Although propeller jets may extend deep enough to create a slight disturbance in water flow to affect the Pacific herring, it is unlikely that these effects are greater than those induced by tidal fluctuations (EVS 1999). It is also possible that the passage of a shadow caused by a moving ship would induce a type of avoidance behavior. Disruption of Pacific herring migration pathways by ship traffic cannot be ruled out as a potential risk factor for Cherry Point Pacific herring.” (NOAA Technical Memorandum NMFS-NWFSC-76)

III. ALTERNATIVES

* In light of foreseeable and significant adverse impacts on the Cherry Point Pacific herring stock, a specific alternative must be dedicated to analysis of a No Action decision for construction of the Gateway Pacific Terminal.

*All alternatives must address the impacts of a reduced Cherry Point Pacific herring stock on Federal and State Endangered and Threatened species lists, and species of concern.

- * Each alternative must address how the State of Washington's "no net loss" concept is addressed in terms of the population dynamics of the Cherry Point Pacific herring stock.

IV. Required Additional Information

- * Require a study to determine the effect of shading on eel grass and algae under other piers along Cherry Point.
- * Require that any pier construction is done when least disruptive to herring spawning activities.
- * Demand that no armoring or dredging be undertaken as a part of the project.
- * Ensure that no activities will interfere with the replacement of sediment along the shoreline.
- * Insist on a rigorous study to determine the potential effects of propeller wash generated by tugs and ships using the facility.
- * Conduct a study to determine the effects of the potential noise pollution from the marine traffic increase resulting from the operation of a GPT.
- * GPT should be able to verify their statement that studies of coal dust at Roberts Bank coal terminal does not apply to Cherry Point.
- * Determine the effect of artificial lighting from the pier on herring spawning success.
- * What effect will a significant increase in marine traffic have on Cherry Point Pacific herring both in the pre-spawning holding areas and on the spawning beds.
- * Initiate a study of the post hatching movements of the larval stage in the herring life cycle.
- * Initiate a fish tagging study to learn definitively what the migration pattern of both younger and older age groups of the Cherry Point Pacific herring stock is.
- * Commission a study to better determine the causes for the CPPH population decline.

V. The importance of rigorous Herring Population Studies

In the comments above I have suggested a number of areas where I think it is imperative that the GPT EIS should insist on rigorous field studies of the current environment rather than retrospective assessments of unsupported data. An example of the latter is W.G. Landis, et. al. 2004 ("A Regional Retrospective Assessment of the Potential Stressors Causing of the Cherry Point Pacific Herring Run").

I would like it noted that much of the information used in the GPT Issue Brief (September 24, 2010) is based on that report and the report is used as if the information in it was based on rigorous scientific studies and that the conclusions should be accepted as fact. Please note that most of its references old data from commercial fishing harvests using equipment and techniques that changed radically over time, i.e., fishing equipment and knowledge were much different and saw significant advances between the 1890s then in the 1970s and measurement by the acoustic/ trawl surveys used after the 1990s does not measure the same thing as counting caught fish tonnage as recorded earlier.

Further, Landis, et. al. report that the PDO (Pacific Decadal Oscillation) is “the primary factor altering the dynamics of the Pacific herring” after assigning a ranking based on a Retrospective Conceptual Model (*Human and Ecological Risk Assessment*, 10: 271–297, 2004, page 285 Figure 7). Please note, however, that the reason it becomes the primary factor is in the nature of its spacial universality in opposition to the limited spacial scope presented by the other factors considered, i.e., PDO effects the entire Pacific Ocean Basin whereas a hatchery might cover an acre. Without specific studies to verify the effect of a factor it’s value as a foundation for decision-making is severely limited. Using the same Conceptual Model the “stressor” PDO could be replaced with CO₂ (the gas, carbon dioxide) and the results would be the same. There has been a recent and marked increase in global CO₂, concurrent with the collapse of the Cherry Point Pacific herring population, that has resulted in sea surface temperature (SST) increases, that in turn have lead to stock decline, alteration of reproductive success, and a change in age structure of the herring stock. Also, Landis does not explain why many of the South Sound stocks have maintain good populations or even increased as the Cherry Point stock was crashing.

Another aspects of the Landis et. al. 2004 Conceptual Model are equally suspect. While it is reasonable to assume over fishing would result in stock decline and that stock decline would negatively effect fishing, is it also reasonable to assume that PDO would cause stock decline and that the converse is also true (*Human and Ecological Risk Assessment*, 10: 271–297, 2004, page 285, Figure 7).

It is also possible, using the population figures provided by Landis, et. al., to conclude that primary cause of the population crashes in the 1930s and 1970s was a direct result of pre-1940 over-fishing and then, after a period of recovery, the initiation of the General Purpose Fishery in 1957 which in turn lead to a new population crash.

IV. References:

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